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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/719,693	11/21/2003	Kenneth O. McElrath	3006.002000/KDG	1355

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WILLIAMS, MORGAN & AMERSON  
10333 RICHMOND, SUITE 1100  
HOUSTON, TX 77042

EXAMINER

WALFORD, NATALIE K

ART UNIT PAPER NUMBER

2879

DATE MAILED: 05/04/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/719,693

**Applicant(s)**

MCEL RATH ET AL.

**Examiner**

Natalie K. Walford

**Art Unit**

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 February 2006.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 11-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Response to Amendment*

The Amendment, filed on February 13, 2006, has been entered and acknowledged by the Examiner.

Claims 1-10 are pending in the instant application.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smalley et al. (US PUB 2002/0085968) in view of Jin (US 6,465,132).

Regarding claim 1, Smalley discloses a carbon nanotube particulate on a surface wherein the carbon nanotube particulate comprises entangled small-diameter carbon nanotubes (page 7, paragraph 89) arranged in a three-dimensional network (Abstract) wherein the small-diameter nanotubes have an outer diameter in a range of about 0.5 nm and about 3 nm (page 7, paragraph 88), wherein the carbon nanotube particulate has a cross-sectional dimension in a range of about 0.1 micron and about 100 microns (page 4, paragraph 64), but does not expressly disclose that carbon nanotube particulate is an electron emitter, as claimed by Applicant. Jin is cited to show that carbon nanotube is used as an electron emitter in a field emission display (FIG. 6, item 112).

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Jin teaches that carbon nanotubes exhibit interesting physical properties such as one-dimensional electrical behavior, quantum conductance, and ballistic transport characteristics. The ballistic transport allows the passage of huge electrical currents in electronic circuits (column 1, lines 41-48).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Smalley's invention to include the carbon nanotube particulate as an electron emitter as suggested by Jin for allowing huge electrical currents.

Regarding claim 2, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the particulate has a cross-section dimension in the range of about 0.1 micron and about 3 microns (Smalley; page 4, paragraph 64).

Regarding claim 3, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the carbon nanotubes are selected from the group consisting of single-walled carbon nanotubes, double-walled carbon nanotubes, triple-walled carbon nanotubes, quadruple-walled carbon nanotubes and combinations thereof (Smalley; page 3, paragraph 58).

Regarding claim 4, the combined reference of Smalley and Jin disclose the electron emitter of claim 1 wherein the carbon nanotube particulate comprises ropes of carbon nanotubes (Smalley; page 7, paragraphs 88-89).

Regarding claim 5, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the ropes have a cross-sectional dimension in a range of about 10 nm and about 50 nm (Smalley; page 7, paragraph 88).

Regarding claim 6, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the ropes have a cross-sectional dimension less than 10 nm (Smalley; page 7, paragraph 88).

Regarding claim 7, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the carbon nanotube particulates comprise small-diameter carbon nanotubes having more than about 10 small-diameter carbon nanotubes/ $\mu\text{m}^2$  surface area of the carbon nanotube particulates (Smalley; page 7, paragraph 89).

Regarding claim 8, Applicant is claiming the product of a carbon nanotube particulate including a method (i.e. a process) of making the carbon nanotube particulate activated by etching, consequently, claim 8 is considered a “product-by-process” claim. In spite of the fact that a product-by-process claim may recite only process limitations, it is the product and not the recited process that is covered by the claim. Further, patentability of a claim to a product does not rest merely on the difference in the method by which the product is made. Rather, is the product itself which must be new and not obvious. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Accordingly, the structure implied by the process steps would be considered for assessing the patentability of product-by-process claims over the prior art (see MPEP 2113).

Regarding claim 8, the combined reference of Smalley and Jin disclose the electron emitter of claim 4, wherein the carbon nanotube particulate on the surface has been activated by etching (Jin; column 9, lines 20-26).

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Regarding claim 9, the combined reference of Smalley and Jin disclose the electron emitter of claim 4 wherein the electron emitter is a component in a cathode (Smalley; FIG. 6, item 110) of a field emission device.

Regarding claim 10, the combined reference of Smalley and Jin disclose the electron emitter of claim 9 wherein the field emission device is selected from the group consisting of electron tubes, amplifiers, oscillators, mixers, microwave components, discharge initiators, laser tubes, spark gaps, controlled discharge tubes, directed energy devices, display tubes, flat-panel displays and combinations thereof (Jin; column 2, lines 36-39).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

In regards to Applicant's arguments regarding Jin, the Examiner notes that the nanowires are substantially vertically aligned relative to the substrate (column 3, lines 61-65). They also have an average deviation of 25 degrees (column 3, lines 61-65). Jin also discloses that the nanowires are formed in bundles, i.e. like ropes, suggesting that they would become somewhat entangled, especially due to the deviation of the nanowires. It should also be noted that Jin teaches that the nanowires are comprised of particles with an average size of 1 nm (column 4, lines 64-66), meaning that the nanowires are composed of particles in a one-dimensional network. Furthermore, the Examiner respectfully notes that all Applicants' arguments came from background of the invention, as opposed to Jin's detailed description of the invention.

***Conclusion***

Applicant's amendment of claim 1 regarding the carbon nanotubes in a three-dimensional network necessitated the new ground(s) of rejection presented in this Office action.

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Natalie K. Walford whose telephone number is (571)-272-6012. The examiner can normally be reached on Monday-Friday, 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

nkW

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4/26/06

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**NIMESHKUMAR D. PATEL**  
**SUPERVISORY PATENT EXAMINER**  
**TECHNOLOGY CENTER 2800**